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FISH HEALTH BULLETIN No. 2

CHANNEL CATFISH VIRUS DISEASE

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1989

INTRODUCTION

Channel catfish virus (CCV) disease is a severe, short-lived infection of cultured channel catfish. It occurs primarily during summer and mostly in fry and fingerlings less than 4 months old. The virus is similar to the one that causes cold sores in humans. Since its identification in 1968, CCV has been isolated from infected fish in most areas of the United States where channel catfish are cultured.

DIAGNOSIS AND IDENTIFICATION

A sudden increase in the rate of deaths in young channel catfish is often the first indication of CCV infection. Fatally infected fish swim erratically or convulsively, sink to the bottom, become inactive, breathe weakly but rapidly, then die.

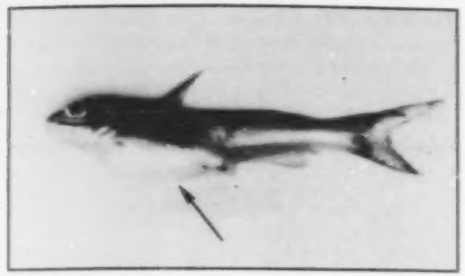
Signs of the disease vary, but some or all of the following may be observed: swollen abdomen due to the accumulation of a clear straw-colored fluid in the body cavity (see Figure); "pop-eye"; pale or bloody gills; and bloody areas at the bases of the fins and throughout the skin—particularly on the abdomen. Although the liver and kidneys may be pale, blood flow increases throughout the internal organs. The spleen generally is enlarged and dark red. The stomach and intestine lack food but are filled with mucus. In fingerling channel catfish, the observed signs may resemble those of enteric septicemia, a bacterial disease caused by *Edwardsiella ictaluri*.

The virus is frequently found in fish with secondary bacterial infections, such as those caused by *Aeromonas hydrophila* or *Flexibacter columnaris*. Therefore, it is important that examination of catfish for the virus be coupled with a bacteriological examination.

Positive virus identification must be made in the laboratory.

CAUSE OF THE DISEASE

The causative agent of CCV disease belongs to the herpesvirus group. Because the virus dies outside of the fish (except under unusual conditions), it requires a host fish in order to survive. It lives for almost 6 months in frozen fish but survives for only about 14 days in iced fish and 2 days in decomposing fish. Viability of CCV is retained in pond water at 77° F (25° C) for 7 days and for longer periods in colder water. The virus is susceptible to drying and is killed in 24 to 48 h on porous surfaces such as concrete and fish netting. It is immediately rendered noninfectious in mud. The virus can be destroyed by exposure to ultraviolet light for 20 to 40 min, heating to 140° F (60° C) for 1 h, or exposure to seawater.



Fingerling channel catfish, about 4 in. (10 cm) long, infected with CCV. Note swollen abdomen.

SOURCE OF INFECTION

Channel catfish virus has been isolated from fry and fingerlings during disease outbreaks (epizootics). These fish are a source of infection for other fish. The virus has been found in adult channel catfish collected in January, when the water temperature was 44° F (7° C)—suggesting that CCV may be present, but inactive, in adult fish during much or all of the year. Transmission of the virus from adults to offspring has not been proven.

TRANSMISSION

Under experimental conditions, CCV can be transmitted from infected dying or dead fish to healthy fish through the water. The virus also can be transmitted experimentally by injection, incorporating the virus into feed, or swabbing the gills with a solution containing the virus.

INCUBATION PERIOD

The incubation period (from infection to first appearance of disease signs) is directly related to water temperature; the disease progresses more rapidly as the temperature increases. Experimental infection at 86° F (30° C) is followed by signs of the disease in 32–72 h and the first deaths occur several hours later; at 68° F (20° C), the incubation period is 10 days. A group of naturally infected 21-day-old fry in 82° F (28° C) water developed signs of CCV disease and died within 72 h.

DETECTION

The most reliable method for detecting CCV is to isolate it in cell cultures in the laboratory. Detection of CCV carrier fish is more difficult, requiring sophisticated laboratory procedures. Infectious CCV can be detected from the time the first signs appear until soon after death. Isolating virus by routine procedures is difficult, even impossible, once the clinical signs—enlarged abdomen, "pop-eye", and hemorrhage—have passed.

SUSCEPTIBILITY OF FISH SPECIES

The channel catfish is clearly the principal species affected by CCV. Experimental infection can be induced by injection in fingerling blue catfish and hydrids of channel catfish but not by oral exposure or by exposure to virus-infected channel catfish fingerlings. Neither brown bullheads nor yellow bullheads could be infected by injection or by feeding them the virus. Feeding virus to different strains of channel catfish fry has indicated that susceptibility varies among strains. The young of different cross-strains of channel catfish were more resistant to CCV than were pure strains. Channel catfish up to 1 year old or 4–6 in. (10–15 cm) long were susceptible under experimental conditions, and clinical signs of CCV disease were observed and virus was isolated from adult (2½-year-old) channel catfish 1 week after waterborne exposure to the virus. The growth of survivors of CCV outbreaks is sometimes stunted.

GEOGRAPHIC DISTRIBUTION

Channel catfish virus has been reported in culture systems in most southern States and in other areas of the United States where channel catfish are grown. It also has been isolated from fry shipped from the United States to Honduras, Central America. Isolation of CCV from wild channel catfish has not been reported.

DISEASE OCCURRENCE

Cases of CCV disease have been diagnosed from June to September. A number of disease outbreaks occurred

after handling and when water temperatures were above 77° F (25° C). Laboratory experiments and field studies indicated that temperatures of 77–80° F (25–27° C) favor the development of CCV. Outbreaks at catfish farms increase during years of high water temperature and in fingerling ponds that are heavily stocked.

METHODS OF CONTROL

There is no known chemical treatment for CCV or other viral diseases of fishes. The only practical control measures are avoidance of the virus, isolation of fish, and sanitation. However, the incidence of the virus is closely correlated to temperature. In laboratory experiments, losses decreased significantly when, after infection, the water temperature was reduced from 82° F to 66° F (28° C to 19° C). This procedure may be useful when cool water is available, although at present it has only limited application.

Surveying brood stocks for CCV antibody or testing stocks of fish during winter may contribute toward avoiding the disease. Also, laboratory evidence suggests that vaccination against CCV is possible.

Ponds from which diseased channel catfish are removed should be drained or disinfected with 40 ppm chlorine. Survivors of CCV outbreaks may be grown to a marketable size, but the fish should be held in ponds that are separated from ponds containing unexposed catfish. Under no circumstances should survivors of CCV epizootics be stocked in noninfected waters, nor should they be used as brood stock.

NOTE: A fish disease specialist should be consulted for diagnostic assistance whenever a disease is suspected and before chemical treatments are used.

The use of chemicals or drugs on fish intended for human or animal consumption must be in accordance with current laws and regulations.

Use of trade names does not imply U.S. Government endorsement of commercial products.

SUGGESTED READING

Fijan, N. N., T. J. Wellborn, and J. P. Naftel. 1970. An acute viral disease of channel catfish. U.S. Fish and Wildlife Service, Technical Paper 43. 11 pp.
Clinical signs of CCV disease and the nature of the virus are described.

Plumb, J. A. 1986. Channel catfish virus disease. U.S. Fish and Wildlife Service, Fish Disease Leaflet 73. 7 pp.
Detailed description of CCV disease, including diagnosis, cause, clinical signs, host and geographic range, transmission and incubation, detection, and control.

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